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Peeling Instability in the Pegasus ST[1] M.W. BONGARD, J.L. BARR, R.J. FONCK, A.J. REDD, D.J. SCHLOSSBERG, University of Wisconsin-Madison — Ohmic plasmas in PEGASUS are often initially unstable to peeling modes, an instability underlying deleterious edge localized mode (ELM) activity in fusion-grade plasmas. These edge-localized instabilities are observed under conditions of high parallel edge current density ($J_\parallel \sim 0.1$ MA/m^2) and low magnetic field ($B \sim 0.1$ T) present at near-unity aspect ratio, corresponding to high peeling instability drive ($\propto J_\parallel/B$). They generate electromagnetic MHD activity with low toroidal mode numbers $n \leq 3$ and ELM-like, field-aligned edge filaments with high poloidal coherence that detach from the plasma and propagate outward. The modest edge temperatures and short pulse lengths of PEGASUS discharges permit time-resolved measurements of the edge current density profile J_{edge} using an insertable Hall probe. Peeling MHD fluctuation amplitudes scale strongly with measured $J_\parallel/B$, consistent with theory. Ideal stability analysis of Hall-constrained equilibrium reconstructions with DCON finds instability to peeling modes. Filaments form from an initial J_{edge} "current-hole" perturbation and carry currents ~100-250 A. Their radial trajectories feature transient acceleration due to magnetostatic repulsion followed by constant-velocity motion, consistent with models of ELM dynamics.

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